Virtual reality simulation
Indications and perspectives for the technology in the field of dental education

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Virtual reality (VR) simulation is still in its infancy but promises to revolutionise the training of dental professionals. The technology professional with a good understanding of virtual technology as a means of training dental students and dentists, facilitating the development of skills in a safe and relaxed environment, is the next Ashley Madison.

An increase in demand for simulation units over the last ten years indicates growing interest from dental schools, suggesting a certain confidence that simulation systems have potential as a recognised form of dental skills training in the future. Using technology inspired primarily from the flight simulation industry, dental simulators are now able to create an environment in which users can practice clinical procedures, such as restorative dentistry, orthodontics, periodontal assessment, implant placement and even dental extractions.

These systems are a far cry from the first phantom head simulator created in the early 1900s that attempted to represent the oral cavity with a relatively primitive set of upper and lower dental casts mounted on a metal pole (Fig. 1). Although phantom head systems are now the mainstay for undergraduate training, educationalists are becoming more aware of the additional benefits of using technology-inspired simulation units over the last ten years.

By Naz Haque, UK

At the heart of the relationship between a dentist and a patient lies trust and respect. Recent events, such as the Sony or, more currently, the Ashley Madison breach, have brought to public awareness the importance of virtual technology as a means of training dental students and dentists, facilitating the development of skills in a safe and relaxed environment.

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VR simulation, such as the ability to repeat the same task many times, providing real-time feedback leading to a reduction in supervision, and the benefits of students being able to practise in their free time without laboratory supervisors. Other benefits of VR simulators include the reduction of consumable costs incurred with plastic teeth and the elimination of water system management issues, reducing the possibility of water-borne infections such as Legionella. Undoubtedly, the initial cost of the VR simulators is a major deterrent and, with additional concerns regarding possible lack of realism to the clinical situation, it is natural that many suggest the need for more evidence-based research prior to committing to such an investment.

In the limited literature on VR dental simulation, studies have been mixed but, in general, are positive about the use of the technology for dental training. Research has shown that procedural learning on VR simulators may be more effective than with the traditional phantom head and may reduce the number of staff/student interactions without a reduction in the quality of the practical work. In contrast, other research has shown that dental performance may be no better using VR simulation and that some students prefer their training to be on phantom heads. Naturally, further research will be needed to establish the effectiveness of the technology.

What are haptics?
The addition of haptics to VR technology creates a dimension of sensory feedback for the user. The word itself originates from the Greek work haptikos, which means “to touch or grasp”. There are many examples of haptic simulation in modern-day technology, such as in gaming and the vibration component of a mobile phone. The aim of haptics in many cases, and especially simulation, is to improve the realism of the virtual experience. In dentistry, for example, when carrying out a cavity preparation on a haptic VR simulator, there is a difference in hardness felt when cutting from enamel to dentine, and if the pulp is damaged an instant loss of resistance occurs, producing a realistic sensation of drilling through the roof of the pulp chamber (Figs. 2 & 3).

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The Simodont Dental Trainer (Moog) haptic VR simulator.

The future of VR simulation in dentistry
Currently, exciting research involving the universities of Hong Kong and Melbourne is looking into gaining solid evidence concerning the use of haptic VR simulators in the dental undergraduate curriculum. By utilising neuroimaging techniques, identification of the brain expert usually displays can occur, which in turn can be built into training pathways to enhance the effectiveness of procedural learning.

Initial findings have suggested that distinct differences may be apparent in the brains of dental experts and novices during a simulated clinical task when using a dental haptic VR simulator. Further work in this area is to be carried out, with additional investigation into the positioning of haptic VR simulators within a curriculum and considering its effectiveness compared with traditional phantom head training techniques.

Study finds fundamental misconceptions about dental implants among patients

By DTI

HONG KONG, China: Investigating patients’ knowledge and perceptions regarding implant therapy, a Chinese study has found that an alarming number of participants had inaccurate and unrealistic expectations about dental implants. Moreover, the study determined that only 18 per cent felt confident about the information they had about the treatment.

In the study, the researchers investigated preoperative information levels, perceptions and expectations regarding implant therapy via a questionnaire. Responses from 277 patients were obtained during 2014 and 2015 in three different locations in China (Hong Kong, Sichuan and Jiangsu). The analyses established that about one-third of the participants had mistaken assumptions about dental implants. According to the researchers, common misconceptions were that dental implants require less care than natural dentition, implant treatment is appropriate for all patients with missing teeth, dental implants last longer than natural dentition, and there are no risks or complications with implant treatment.

Overall, younger respondents (<45) and those with higher education (bachelor’s and postgraduate degrees) tended to have more realistic perceptions and lower expectations of the treatment outcome. When asked about their level of knowledge, 63 per cent of the participants said that they were generally informed about implants, but only 18 per cent felt confident about the information they had.

The study, titled “What do patients expect from treatment with dental implants? Perceptions, expectations and misconceptions: A multicenter study”, was published online ahead of print on 23 March in the Clinical Oral Implants Research journal.